APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/967,031	09/27/2001	Lokpraveen B. Mosur	2207/11305	4804

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EXAMINER
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ART UNIT	PAPER NUMBER
2187	

DATE MAILED: 01/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>27 September 2001</u> .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-30</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-30</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>27 September 2001</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4</u> .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1.   The enclosed detailed action is in response to the Information Disclosure Statement

submitted on January 14, 2002 and the Application submitted on September 27, 2001.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
> subject matter which the applicant regards as his invention.

3.   Claims 7, 14 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

4.   Claim 7 recites the limitation "the logical arrangement" in line 2. There is insufficient

antecedent basis for this limitation in the claim.

5.   Claim 14 recites the limitation "the die" in line 2. There is insufficient antecedent basis

for this limitation in the claim.

6.   Claim 19 recites the limitation "said full list" in line 2. There is insufficient antecedent

basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

7.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the
> invention by the applicant for patent, except that an international application filed under the treaty defined in

section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

8.   Claims 1 and 13-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Otterness

et al. (USPN: 6,460,122).

Regarding claim 1, Otterness discloses an apparatus for cache flushing comprising a list structure

(list structure is comprised of cld_type in the cache line descriptors [CLD]) for tracking the

status of a plurality of cache entries, wherein the list structure is located outside of the cache

(Figure 3, cld_type is located in CLD in Reference 204, which is outside of cache Reference 210;

C 12, L 12-13); a query mechanism for checking the list structure for the state of a cache entry

and a cache flush mechanism, logically coupled to the list structure and the cache, for flushing a

cache entry and for modifying the list structure to reflect the flushed state (C 12, L 12-17, L 30-

33).

Regarding claims 13-14, Otterness discloses the list structure located in a random access memory

[in the die of the RAM] (Figure 3, Reference 204).

9.   Claims 1-5, 7-12, 14, 16-23, 25-27 and 29-30 are rejected under 35 U.S.C. 102(e) as

being anticipated by Masubuchi et al. (USPN: 6,490,657).

Regarding claim 1 and 8-12, Masubuchi discloses an apparatus for cache flushing comprising a

list structure for tracking the status of a plurality of cache entries, wherein the list structure is

located outside of the cache (Figure 1, References 32, 33, 34; C 11, L 17-19, L 41-53; C 11, L

60-67; C 12, L 1-5); a query mechanism for checking the list structure for the state of a cache

entry (C 12, L 13-30 - logic within Reference 5 of Figure 1 which performs checking) and a

cache flush mechanism, logically coupled to the list structure and the cache, for flushing a cache

entry and for modifying the list structure to reflect the flushed state (C 12, L 13-30, L 33-34 –

logic within Reference 32 which performs cache flushing and modifying).

Regarding claims 2, 17, 19 and 22, Masubuchi discloses the list structure comprising one bit per

cache line (C 14, L 13-16; Configuration 3-A; C 17, L 21-24 – one of the bits a Region).

Regarding claim 4, Masubuchi discloses the list structure comprises one bit per cache way

(Configuration 4-A; C 17, L 52-59).

Regarding claims 3, 5-6, 18, 20 and 23, Masubuchi discloses the list structure comprising one bit

per plurality of cache lines and wherein the logical arrangement of the list structure conforms to

the variable number (Configuration 3-B; C 17, 31-33; C 14, L 1-6 - one of the bits in a Region)

wherein the variable number is set by the operating system via the device driver for the device.

Regarding claim 7, Masubuchi discloses the logical arrangement of the list structure matches the

architecture of the cache (C 14, L 1-6).

Regarding claims 14, Masubuchi discloses the list structure located in on the die (of the update

memory) (C 11, L 16-18).

Regarding claim 16, Masubuchi discloses a computer system with a cache memory (Figure 1)

and an apparatus for flushing the cache (Figure 1, Reference 30) comprising a list structure for

recording modifications to a plurality of cache entries (Figure 1, References 32, 33, 34; C 11, L

17-19, L 41-53; C 11, L 60-67; C 12, L 1-5); a cache controller (cache flush controller, Figure 1,

Reference 35) adapted to query the list structure for modifications to the plurality of cache

entries and generate a list of cache write-back instructions (C 12, L 13-30, L 33-34); and wherein

the cache controller invalidates (read-line-with-invalidate) the plurality of cache entries

corresponding to the list of cache write-back instructions (C 18, L 5-36).

Regarding claim 21, Masubuchi discloses a multiprocessor computer system with a plurality of

processors and caches and with an apparatus for cache flushing (Figure 1) comprising a list

structure for tracking the status of a plurality of cache entries, wherein the list structure is located

outside the cache (Figure 1, Reference 32; C 11, L 17-19, L 41-53; C 11, L 60-67; C 12, L 1-5);

a processor identification within the list structure for linking the plurality of cache entries to one

of the plurality of processors (C 11, L 41-67; C 12, L 1-5; C 13, L 9-13; C 14, L 13-23); a query

mechanism for checking the list structure for the state of a cache entry identified with a processor

(C 12, L 13-30 - logic within Reference 5 of Figure 1 which performs checking); a cache flush

mechanism for flushing a cache entry linked to an identified processor and for modifying the list

structure to reflect the flushed state (C 12, L 13-30, L 33-34 – logic within Reference 32 which

performs cache flushing and modifying).

Regarding claims 25, 27 and 29-30, Masubuchi discloses a method of cache flushing comprising

creating a table of cache entries separate from the cache (Figure 1, Reference 32); tracking

modified cache entries in the table (C 11, L 17-19, L 41-53; C 11, L 60-67; C 12, L 1-5); and

generating a write-back command from the table in response to a cache flush event (C 12, L 13-

18).

Regarding claim 26, Masubuchi discloses generating an invalidate command in response to a

cache flush event (C 18, L 5-36).

Claim Rejections - 35 USC § 103

10.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

11.   Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Masubuchi

(USPN: 6,490,657) in view of Otterness et al. (USPN: 6,460,122).

Regarding claim 13, Masubuchi does not disclose the list structure located within a RAM,

however, Otterness discloses a list structure located in a RAM. RAMs offer fast access to data

stored therein and thus provides fast retrieval of data. Hence, it would have been obvious to one

of ordinary skill in the art to locate the list structure taught by Masubuchi in a RAM for the

desirable purpose of fast retrieval of data.

12.   Claims 15, 24, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Masubuchi (USPN: 6,490,657).

Regarding claim 24, Masubuchi discloses the limitations cited above in claim 21, however,

Masubuchi does not disclose the list structure located on the die with at least one of the plurality

of processors. However, it is well known in the art to locate elements in a system on the die with

a processor to reduce off chip latency associated with data communications. Hence, it would

have been obvious to one of ordinary skill in the art to locate the list structure on the die with at

least one of the plurality of processors for the desirable purpose of reducing latency.

Regarding claims 15 and 28, Masubuchi discloses the limitations cited above in claims 1 and 25,

however, Masubuchi does not disclose querying the table in response to a snoop command.

However, it is well known in the art to check the status of a cache line during a snoop operation

to maintain coherency and thus it would be obvious to query a table to check the status of a

cache line for the desirable purpose of maintaining data.

Conclusion

13.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

Cai et al. – USPN: 6,470,422 – cache flushing.
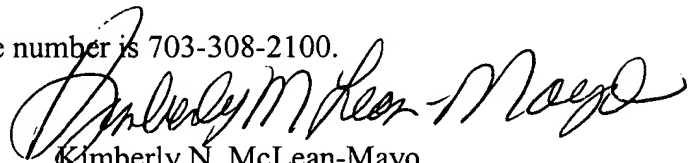
Kurosawa – USPN: 6,418,515 – cache flushing.

McDermott – USPN: 5,860,105 – cache flushing.

14.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Kimberly N. McLean-Mayo whose telephone number is 703-308-

9592. The examiner can normally be reached on M-F (9:00 - 6:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Do Yoo can be reached on 703-308-4908. The fax phone numbers for the

organization where this application or proceeding is assigned are 703-746-7329 for regular

communications and 703-746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is 703-308-2100.

Kimberly N. McLean-Mayo
Examiner
Art Unit 2187

KNM

January 23, 2003